Weather the Storm:
Sustainable Resilient Fiber Cement Building Envelopes

1 AIA LU/HSW CE HOUR + 1 GBCI GENERAL HOUR

JamesHardie™

AIA CES STATEMENT

James Hardie is a registered provider of AIA-approved continuing education under Provider Number K080. All registered AIA CES Providers must comply with the AIA Standards for Continuing Education Programs. Any questions or concerns about this provider or this learning program may be sent to AIA CES (cessupport@aia.org or (800) AIA 3837, Option 3).

This learning program is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

AIA continuing education credit has been reviewed and approved by AIA CES. Learners must complete the entire learning program to receive continuing education credit. AIA continuing education Learning Units earned upon completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

AIA Continuing Education Provider

Course title:

Weather the Storm: Sustainable Resilient Fiber Cement Building Envelopes

Course ID:

0920030591

Approved for:

1.0 CE hour(s)

Course is approved for:

1 GBCI General Hour

GBCI | GREEN BUSINESS CERTIFICATION INC.™

This course is approved by GBCI for continuing education. Approval for this course indicates it will be monitored by GBCI to ensure that it upholds the quality, relevance and rigor necessary to contribute to ongoing learning in knowledge areas relevant to the green building industry.

COURSE DESCRIPTION

Constructing building envelopes designed to withstand extreme weather events and the impact of drastic temperature swings, join us for this one-hour course on building with fiber cement cladding. Participants will examine the importance of building sustainably with fiber cement cladding designed for resiliency to ensure structural stability and life safety. Catastrophic weather events require that the materials that comprise the building envelope are high-performance enough to endure fire, hurricanes, flooding, extreme cold, and heat.

Throughout this course, participants will discover the design and engineering behind fiber cement products that offer flexibility and function in a broad range of climate zones with weather, fire and pest resistance. Customizable to meet the demands of project design, fiber cement cladding responds to an array of challenges related to climate, design, performance and end user safety. After this course, participants will have a command of the evolutionary progress made in fiber cement products for the built environment and architectural specification.

LEARNING OBJECTIVES

- **Evaluate** determining factors like consumer input, community engagement, environmental concerns, and safety that drive innovation for fiber cement manufacturers.
- **Examine** fiber cement's attributes, such as its product features, advantages, and optimal usage techniques, alongside its materials, to evaluate its influence on moisture regulation within the building envelope, and its implications for occupant health.
- **Classify** code criteria, standards, sustainability and testing that inform fiber cement product design and architectural specification.
- **Analyze** relevant case studies related to fiber cement cladding that highlight sustainability, durability, moisture management and design.

PART 01

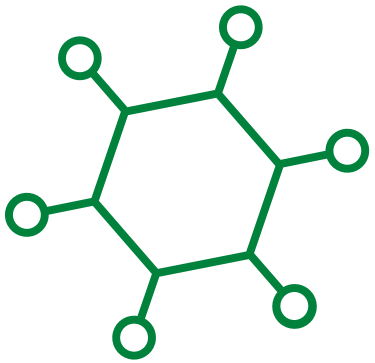
BUILDING ENVELOPE

Building Envelope Functions:

- Thermal barrier
- Control moisture
- Structural integrity
- Aesthetic appeal
- Occupant comfort and safety

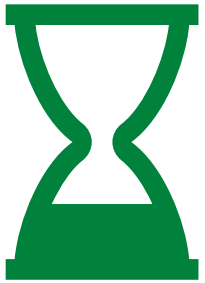
LESS IS MORE

Fiber Cement Cladding Ingredients:

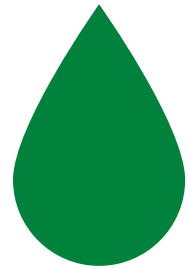


Cellulose Fibers

Portland Cement



Sand



Water

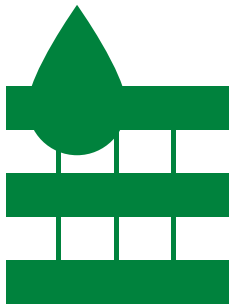
FIBER CEMENT CLADDING

Fiber Cement Cladding:

- Developed in the 1980's
- Non-combustible (ASTM E 136)
- Class A Fire Rating
- Pest resistant
- UV resistant
- Miami-Dade impact resistance

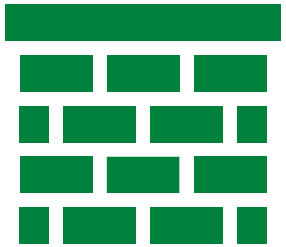
MOISTURE MANAGEMENT PRINCIPLES

Deflection



Drainage

Drying



Durability

DEFLECTION STRATEGIES

- Properly sized roof overhangs and eaves
- Deflect water
- Flashing around windows, doors, and roofs
- Shed water efficiently with overlaps

DRAINAGE STRATEGIES

- Install house wraps that allow water to drain away from wall cavity
- Design roofs and decks with enough slope to facilitate water runoff
- Integrate weep holes in masonry and cladding systems
- Install foundation drainage systems

DRYING STRATEGIES

- Ensure ventilation in attics, crawl spaces, and wall cavities
- Install vapor-permeable materials so moisture will exit
- Maximize exposure to the sun for building layout
- Use mechanical dehumidification systems

DURABILITY STRATEGIES

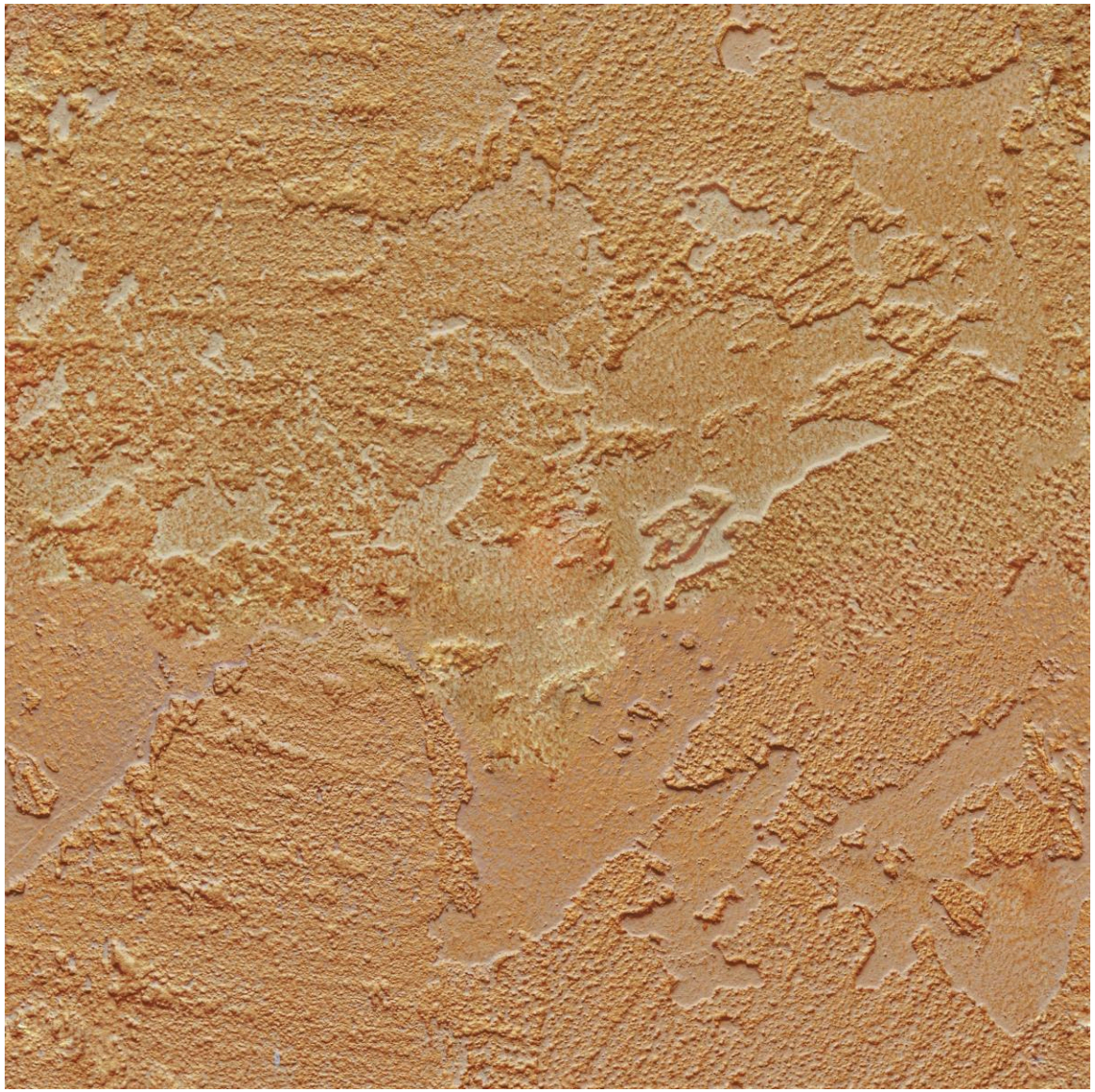
- Specify fiber cement cladding and resistant metals
- Implement regular maintenance practices
- Seal all joints and penetrations
- Prevent gaps and cracks to avoid moisture

CLADDING OPTIONS

- Stucco
- Vinyl
- Masonry
- Engineered wood
- Fiber cement cladding

STUCCO

- Durable and weather-resistant
- Water repellant and fire resistant
- Versatile application
- Regular maintenance required
- Prone to cracking
- Potential for water damage

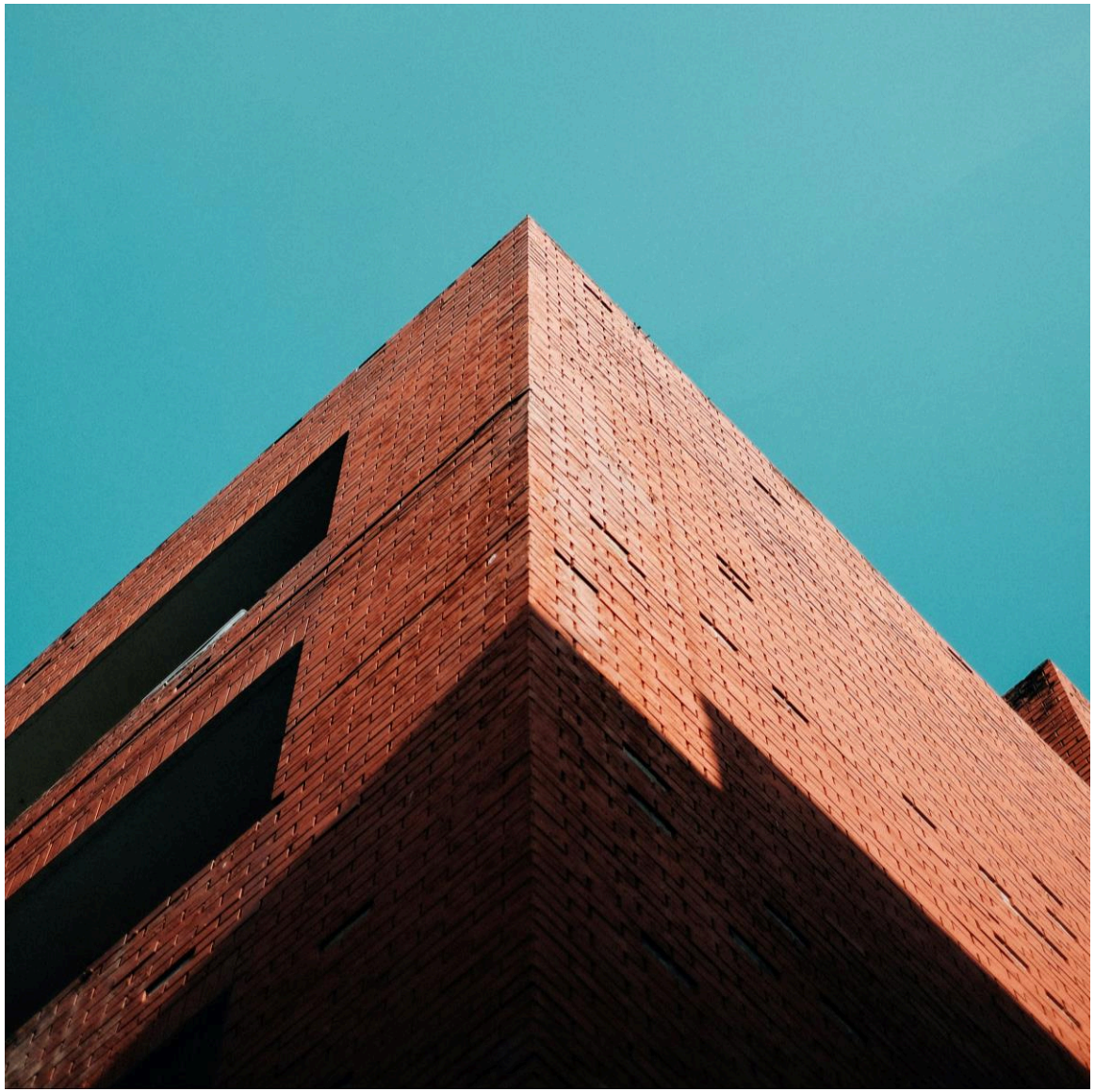


VINYL

- Low maintenance
- Cost-effective
- Design variety
- Susceptible to fading
- Brittleness
- Heat sensitivity

MASONRY

- Low maintenance
- Aesthetics
- Lighter weight
- Foundation requirements
- Grout repair needed
- Potential moisture intrusion



ENGINEERED WOOD

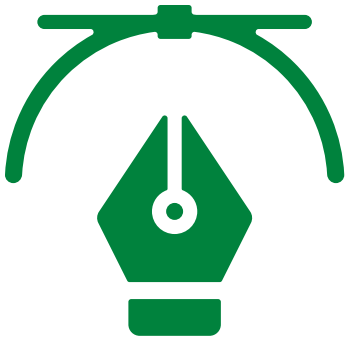
- Mimics real wood
- Durable
- Cost-effective
- Sensitive to moisture
- Absorption issues
- Careful installation required

FIBER CEMENT CLADDING

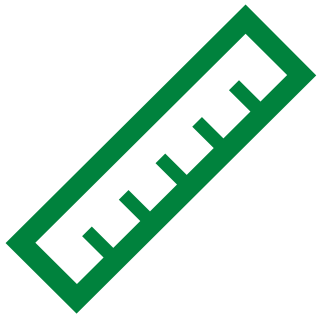
- Versatile design
- Dimensional stability
- Moisture resistant
- Fire resistant
- Environmental durability

PART 02

CRAFTED FOR CLIMATE



Versatile Design



Dimensional Stability

Moisture Resistant

Fire Resistant

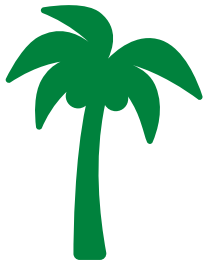
Environmental Durability

CRAFTED FOR CLIMATE

Weather Considerations

- Rain
- Wind
- Hail
- Snow
- Ice
- High humidity
- Ultraviolet exposure

CRAFTED FOR CLIMATE



Tropical

Dry

Temperate

Continental

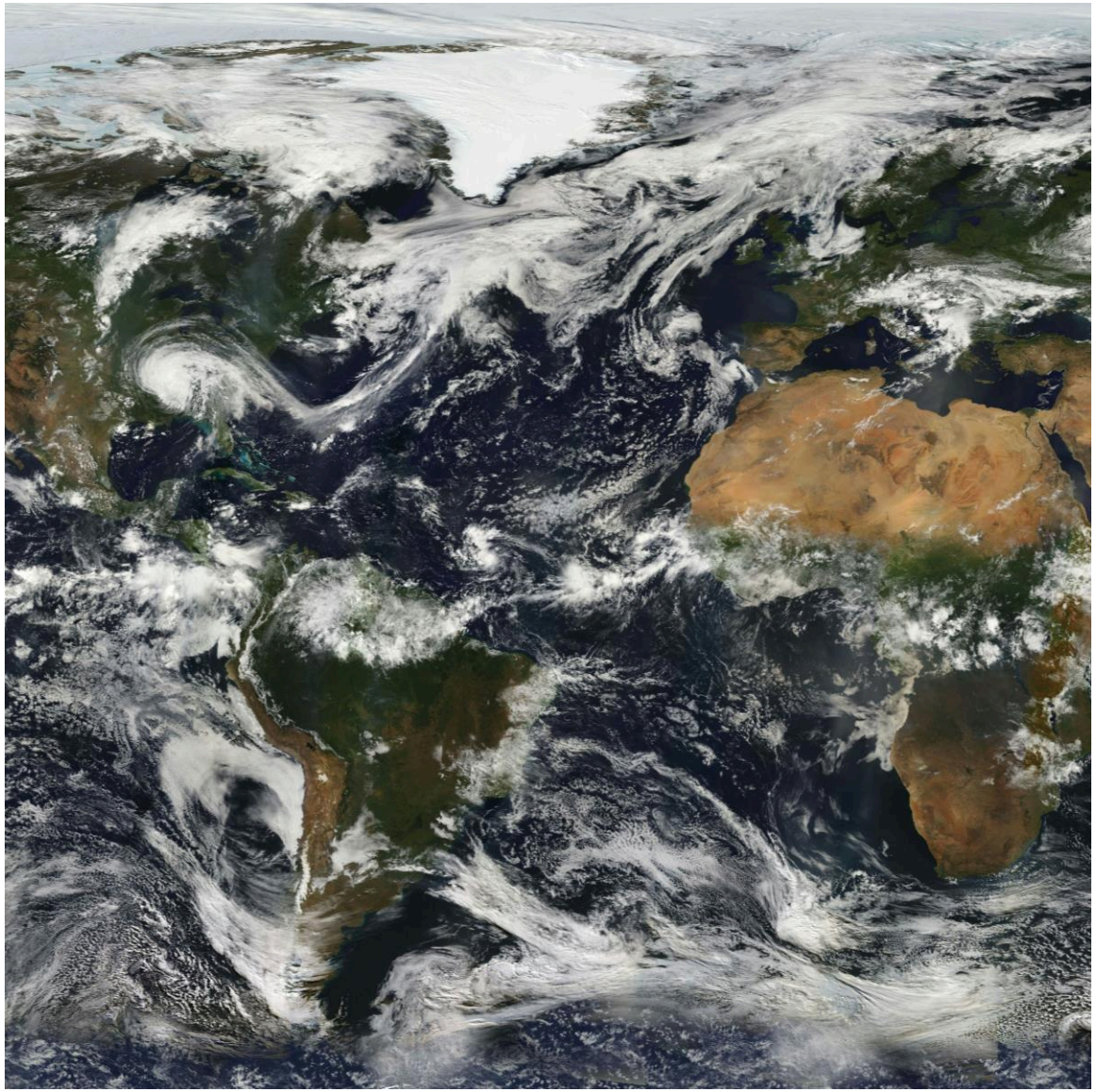
Polar

CRAFTED FOR CLIMATE

Redefined as:

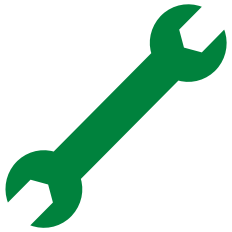
- Hot-humid
- Mixed-humid
- Hot dry/mixed dry
- Cold/very cold
- Subarctic
- Marine

7 out of 8 apply to the continental U.S. while the eighth, subarctic, applies to Alaska



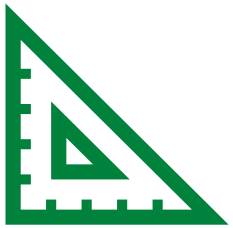
CRAFTED FOR CLIMATE

Engineered for Climate



Low Maintenance

Moisture Resistance



Dimensional Stability

Noncombustible

CRAFTED FOR CLIMATE

Features:

- Resilient in extreme conditions
- Flame resistance
- Fade resistance
- Moisture resistance

MANUFACTURING

Environmental Features:

- Waste reduction
- Recycled content
- Regional materials
- Reduced transport impacts
- High-quality materials

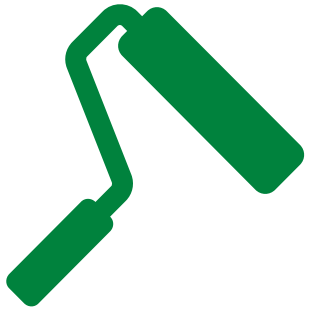
MANUFACTURING

Environmental Features:

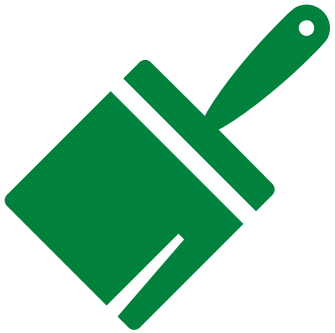
- VOC reduction
- Reduce liquid waste
- Quality control
- Water recycling
- Robust support

MANUFACTURING

Finish Benefits:

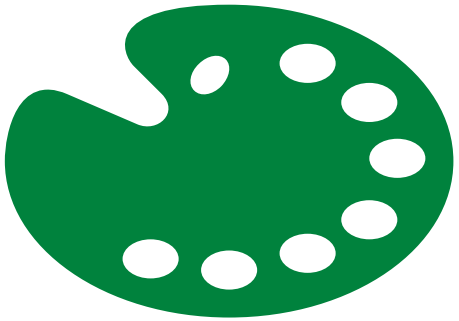


Primed and Ready



Baked-on Finish

Consistent Coating

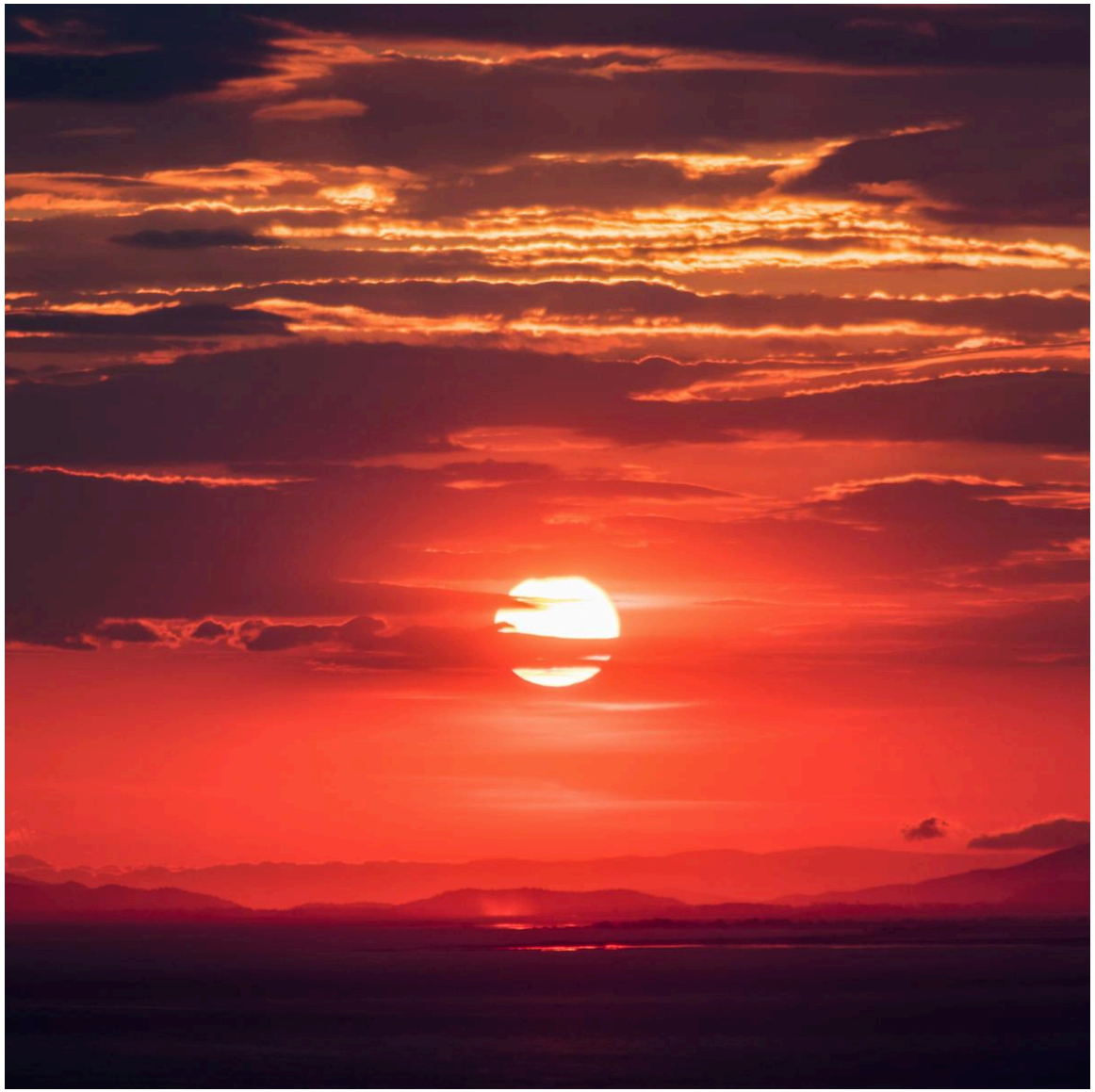


Long Lasting Color

ULTRAVIOLET RADIATION

Cladding Features:

- Resists damage
- Finish consistency
- Durability
- Color retention
- Lower maintenance



BEST PRACTICES: INSTALLATION

- Consider climate and the options available for building in that zone
- Save on maintenance
- Lightweight construction
- Fewer materials
- Less time

BEST PRACTICES: INSTALLATION

Cladding Benefits:

- Efficient installation
- Low environmental impact
- Offers many solutions

BEST PRACTICES: INSTALLATION

- **Wood or Steel Frame:** Can be installed over insulated wood or steel frames
- **Maximum Stud Spacing**: Suitable for studs spaced up to 24” on center
- **Sheathing:** Can be applied directly to 7/16” OSB or equivalent sheathing
- **Improved Wall Efficiency:** Allows for up to 4” of solid foam insulation

BEST PRACTICES: INSTALLATION

- Install over a WRB with 90% drainage efficiency as specified in ASTM 2273
- Use vertical furring with a minimum 3/8” air gap for effective drainage and drying
- Incorporate window head, horizontal trim, penetration block, roof valley extension, kick out, cladding transition flashing, and gutters

MANUFACTURER INNOVATION – STRATEGIC INSIGHTS

- **Customer Feedback:** Crucial for building product value
- **Consumer Preferences:** Innovations based on deep insights
- **Direct Marketing:** Increased demand for higher-value products
- **Community Impact:** Importance of the company's local influence
- **Environmental Responsibility:** Growing significance for consumers and investors

COMMUNITY ENGAGEMENT

Key Drivers:

- Community Engagement
- Environmental Concern
- Innovation
- Zero Harm Safety Initiatives

RESOURCE MANAGEMENT

Environmental Priorities:

- Waste reduction
- Water management
- Energy efficiency
- Community support
- Resilient strategies

PART 03

MARKET FACTORS

Modern Challenges:

- Weather protection
- Aesthetic appeal
- Codes and requirements
- Sustainability
- Resilient design

SAFE DESIGN

According to FEMA

- “The building envelope can be one of the weakest and most susceptible components of a building.”
- “a failed component that is itself small in magnitude, may result in disproportionately greater building damage (and associated repair costs) than that caused by the initial breach in the envelope.”

APPLICATIONS

Excellent product for both residential and commercial applications:

- Single family
- Multi-family
- Retail
- Industrial
- Mixed-use
- Institutional

BUILDING CODES AND TESTING STANDARDS

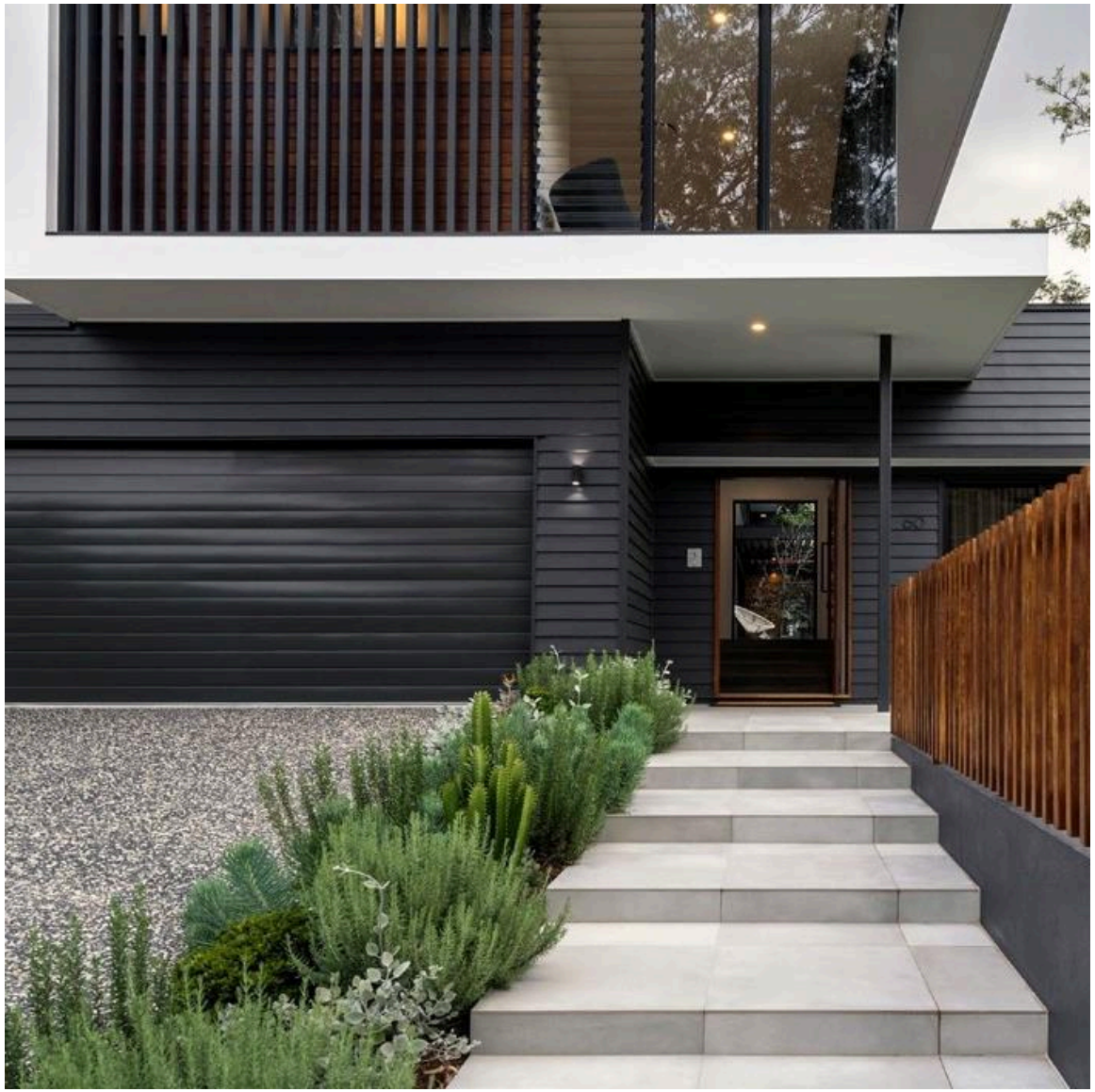
- **Physical Attributes:** ASTM C1185
- **Thermal Attributes:** ASTM C177
- **Durability Attributes:** ASTM C1185 and ASTM G23
- **Fire Characteristics:** ASTM E84, ASTM E136, and ASTM E119

BUILDING CODES AND TESTING STANDARDS

Using fire-resistant materials in construction helps protect buildings and their inhabitants from the devastating effects of fire

NON-COMBUSTIBILITY

Ensure cladding complies with ASTM E136 for non-combustibility, as specified in Section 703 of the International Building Code.



FLAME SPREAD AND SMOKE

Specify fiber cement cladding classified as a Class A material with a Flame Spread Index of 0 and Smoke Developed Index of 5, as per ASTM E84 standards.

FIRE PROPAGATION

Specify non-combustible fiber cement siding for exterior walls, and ensure the cladding is compliant with NFPA 285 standards when used with foam plastic insulation or combustible WRBs.

FIRE RESISTANCE RATED ASSEMBLIES

- Flame penetration through the wall section
- An unacceptable temperature increase on the unexposed side of the assembly
- Structural failure or collapse of the assembly
- Design professionals should consider specifying fiber cement cladding that has 1-hour and 2-hour fire-resistance rated wall assemblies.

FIRE RESISTANCE RATED ASSEMBLIES

Choose durable, resilient cladding materials to protect homes and buildings from the wrath of nature

WIND AND IMPACT RESISTANCE

- ICC-ES criteria for Ultimate Design Wind Speeds over 200 mph
- Miami-Dade County's Notice of Acceptance for High Velocity Hurricane Zones with negative wind pressures up to -104psf
- Florida Department of Business and Professional Regulation for Ultimate Wind Speeds up to 220 mph

FLOOD RESISTANCE

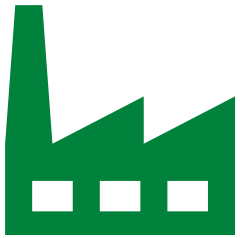
- Class 5 flood resistance rating, the highest by FEMA
- Suitable for areas below the Base Flood Elevation in special flood hazard areas.

PART 04

SUSTAINABILITY

By prioritizing sustainability, we create resilient structures that can withstand the challenges of a changing climate while fostering a healthier planet for future generations.

SUSTAINABILITY



Reducing Emissions

Saving Water

Minimizing Waste

Increasing Diversity

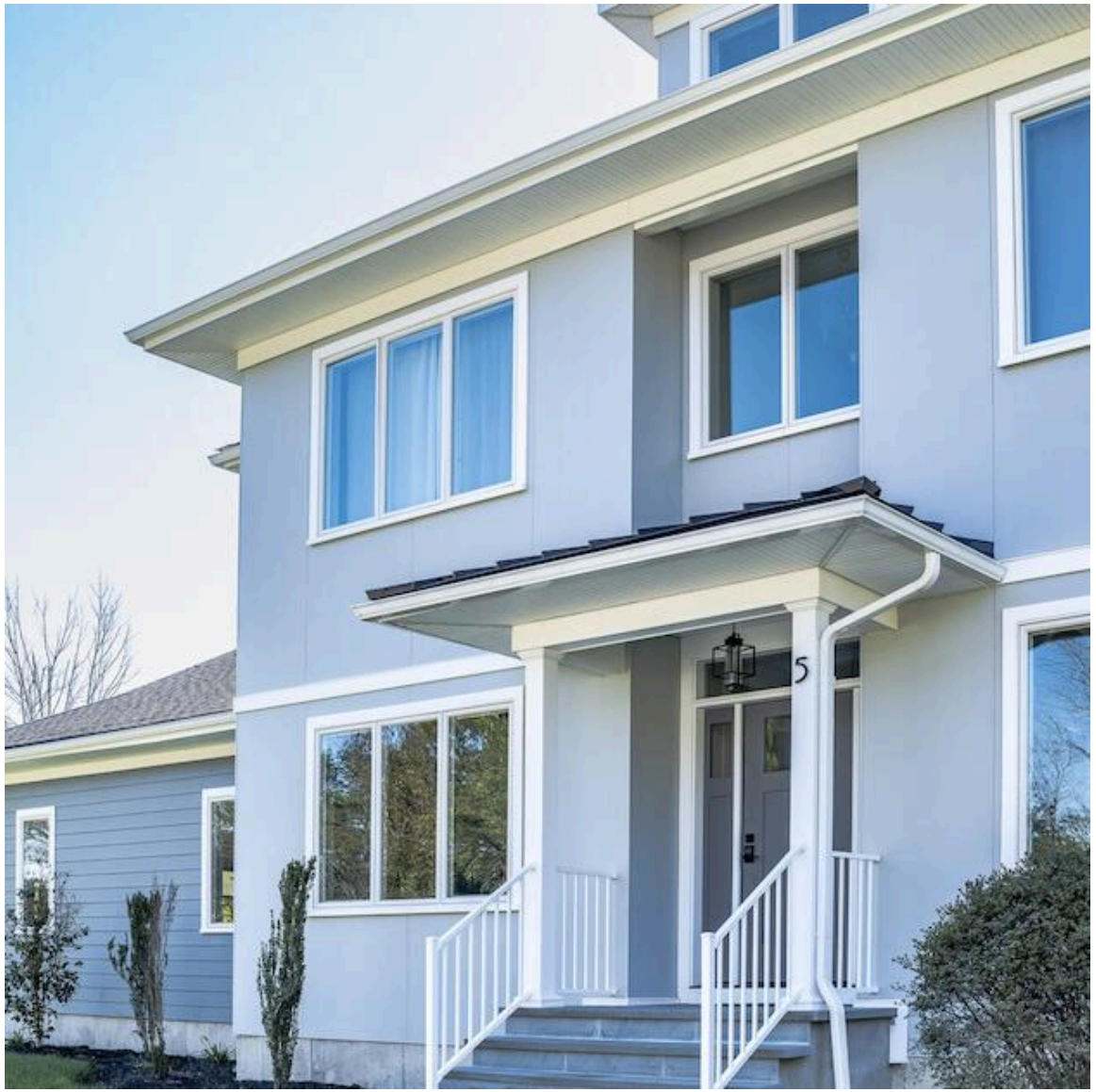
Prioritizing Safety

Product Transparency

REDUCING EMISSIONS

- Carbon-aware specification and procurement consider manufacturing process, mix composition, recycled content, and electricity source.

- Fiber cement is favored for its low carbon footprint, durability, and minimal maintenance needs.



REDUCING EMISSIONS

- **Scope 1** emissions are direct emissions from sources that are owned or controlled by the organization.
- **Scope 2** emissions are indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the reporting organization.

REDUCING EMISSIONS

- Fiber cement cladding products have a lower carbon footprint and environmental impact over their lifecycle
- Fiber cement products capture CO2 from the environment during their operational lifetime
- Re-carbonation

REDUCING EMISSIONS

- Carbonation causes cement-based products to act as natural carbon sinks, sequestering CO2 from the air and storing it permanently.

- Early-stage carbonation may increase the compressive strength of cement-based products, enhancing their durability and structural performance.

SAVING WATER

- In 2022, the company recycled 5.487 million more cubic feet of water than in 2019
- The company plans to recycle an additional 20 million cubic feet of water every year by 2030

MANUFACTURING EFFICIENCY

- The company has set a goal of achieving zero manufacturing waste to landfill by 2035.
- Look for manufacturers that support circularity through two recycling programs that contribute to negative cradle-to-gate CO2 emissions for products and store CO2 during their lifecycle

INCREASING DIVERSITY

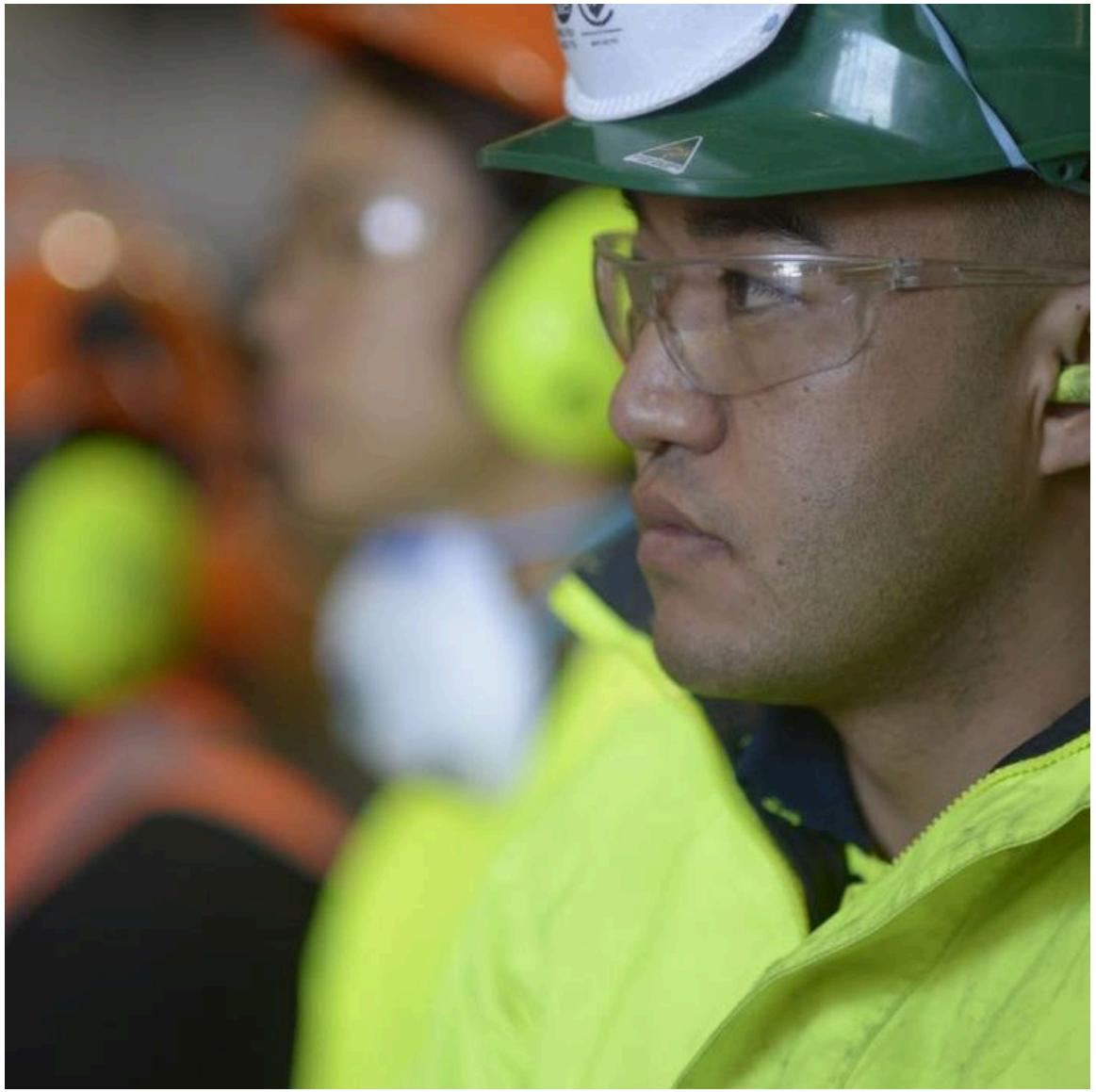
- **30% gender diversity** in senior leadership by FY 2026
- **25% gender diversity** in management by FY 2026
- **30% underrepresented minorities** in management by FY 2026

PRIORITIZING SAFETY

- DART stands for “Days Away, Restricted or Transferred” rates
- In North America, one of the company’s sites achieved a DART rate of 0 against approximately 270,000 hours worked
- The company’s global DART rate was down 10% from 2022

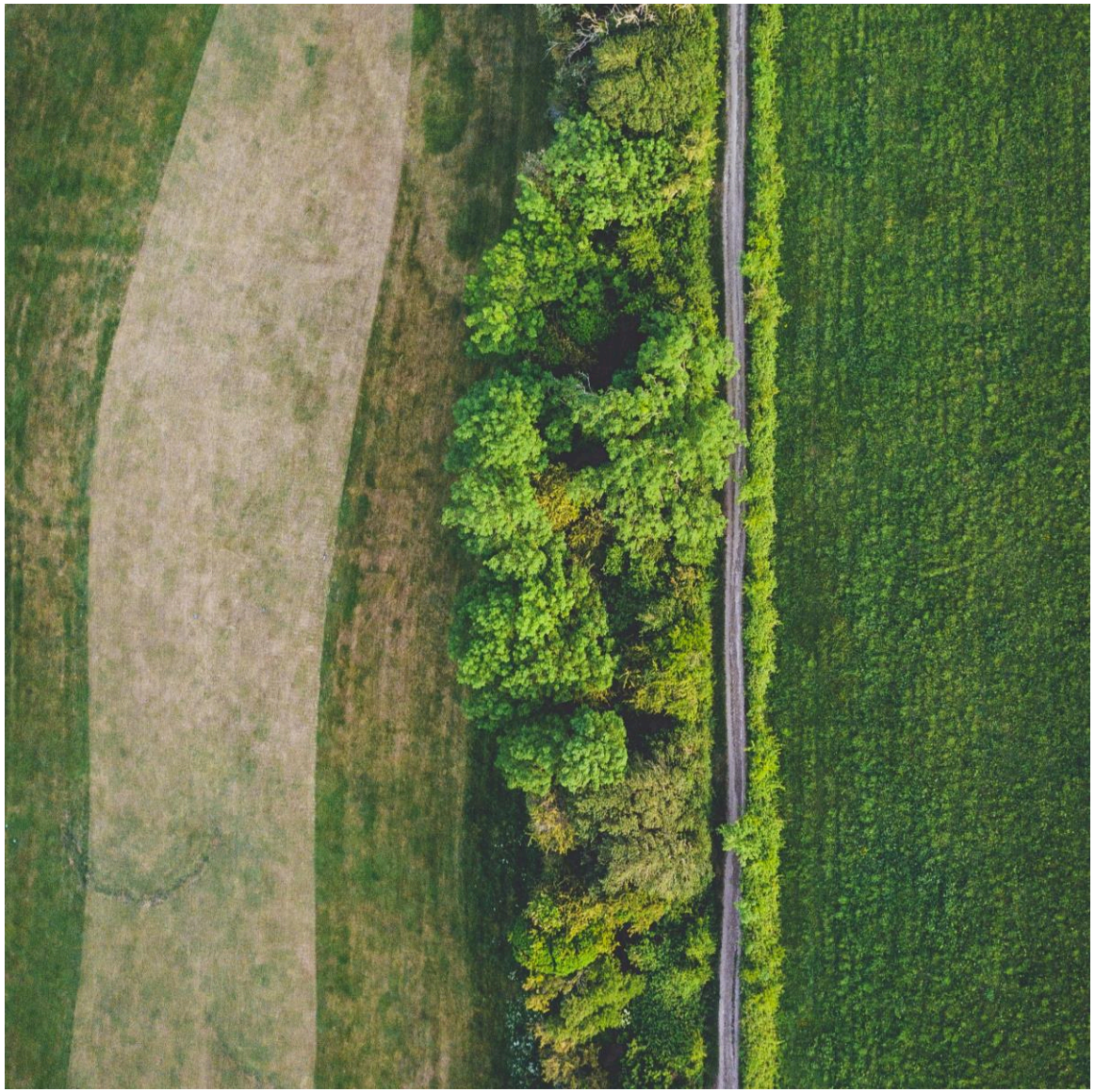
PRODUCT TRANSPARENCY

- 94% of the company revenue is generated from products with EPDs
- EPDs are a standardized way of communicating the environmental effects associated with a product or system's raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water.



PRODUCT TRANSPARENCY

- Global warming potential (GWP)
- Depletion of the stratospheric ozone layer
- Acidification of land and water sources
- Eutrophication
- Formation of tropospheric ozone
- Depletion of nonrenewable energy



GREEN BUILDING RATING SYSTEMS

- LEED
- Living Building Challenge
- CalGreen
- ICC 700 National Green Building Standard
- International Green Construction Code (IgCC)

LEED CREDITS

- **MR: Environmental Product Declarations (EPDs)**
- **MR: Sourcing of Raw Materials**
- **MR: Construction Waste and Demolition Management**
- **EQ: Low-Emitting Materials**

CONCLUSION

CONCLUSION

- **Versatile and Durable:** Fiber cement cladding is adaptable and robust.
- **Weather, Fire, and Pest Resistant:** Suitable for various climates and conditions.
- **Aesthetic Flexibility:** Offers diverse finishes, textures, and colors.
- **Low Maintenance and Long-lasting:** Cost-effective over time.
- **Enhanced Building Performance**: Supports sustainability and visual appeal.

LEARNING OBJECTIVES RECAP

- **Evaluate** determining factors like consumer input, community engagement, environmental concerns, and safety that drive innovation for fiber cement manufacturers.
- **Examine** fiber cement's attributes, such as its product features, advantages, and optimal usage techniques, alongside its materials, to evaluate its influence on moisture regulation within the building envelope, and its implications for occupant health.
- **Classify** code criteria, standards, sustainability and testing that inform fiber cement product design and architectural specification.
- **Analyze** relevant case studies related to fiber cement cladding that highlight sustainability, durability, moisture management and design.

Questions?

Thank You!

JAMESHARDIE.COM

1 (888) 542-7343

JamesHardie™